Challenge of the Chinese Champions

Brief Overview:

In this unit, students will be able to learn about Chinese culture and use graphing activities in order to introduce the statistical concepts of median, mode, and range. Through hands-on activities students will collect, organize, and analyze data in pictographs, bar graphs, and line plots.

NCTM Content Standard/National Science Education Standard:

Formulate questions that can be addressed with data and collect, organize, and display relevant data to answer them.

- Design investigations to address a question and consider how data-collection methods affect the nature of the data set.
- Collect data using observations, surveys, and experiments
- Represent data using tables and graphs such as line plots, and bar graphs.

Grade/Level:

Grades 2-3

Duration/Length:

Three lessons – 60 minutes per lesson

Student Outcomes:

Maryland Voluntary State Curriculum

Standard 4.0 Knowledge of Statistics

A. Data Displays
   1. a-c: Students will collect data by conducting surveys to answer a question In order to organize and display data in line plots, bar graphs, and stem and leaf plots
B. Data Analysis
   1. a-b: Students will interpret and compare data in stem and leaf plots, line plots, and bar graphs in order to show mastery of information contained in the graphs
C. Data Analysis
   2. a-b: Students will determine the mean, median, mode, and range of a set of data in order to interpret the information contained in the graphs.

Materials and Resources:

- Welcome to China by Patrick Ryan ISBN 1-59296-912-7

- Graph paper
- Chart paper
- Markers
- Math Journals or notebooks
- White construction paper
- A pair of scissors per student
- Glue

Development/Procedures:

Lesson 1

Pre-assessment

- Distribute copies of the graph on the top four countries earning gold medals in the 2004 Summer Olympics, with questions addressing median, range, and other questions relating to bar graphs, Student Resource 1. Answers can be found on Teacher Resource 1.

Launch

- Use a K-W-L chart to discover students background knowledge on Chin.
- Conduct an interactive read aloud of Welcome to China by Patrick Ryan introducing students to the different aspects of Chinese culture, especially favorite pastimes.

Teacher Facilitation

- Introduce the bar graph with the following chant:

  X and Y axis. Give it a try.
  X goes along the bottom.
  Y points to the sky.
  Numbers go from zero to infinity.
  Label, and enter data, and add a key.
  Put the title on top.
  It was easy! Now you can come to a stop.

- Point to the title. The title shows the subject of the graph. Point to the x and y axes and explain how the scale starts at zero and continues with intervals of one.
- Survey the children about their favorite sports. Use the information collected to create a class bar graph on students' favorite sports on chart paper and display in front of the class. Facilitate a discussion comparing the favorite sports in China with the favorite sports of the students in your

class. The favorite sports in China are ping pong, swimming, volleyball, gymnastics, soccer, and martial arts.

- Introduce the term, range, which means the difference between the smallest and largest values. It can be determined by subtracting the least value from the greatest value.

Student Application

- Students will create their own bar graph from information provided in the math story about the population of the major cities in China, Student Resource 2. Answers are on Teacher Resource 2.

Embedded Assessment

- Have each student write two questions that are based on the information displayed on the bar graph.

Reteaching/Extension

- Students that have shown difficulty with the mastery of creating a bar graph and determining the range of data will meet in a small group with you to participate in activities related to analyzing data to create a bar graph and show range.

Lesson 2

Pre-Assessment

- Students will interpret data on a bar graph of Olympic swimming times and will be asked to give the most frequent time in order to pre-assess the students' prior knowledge of mode, Student Resource 3. Answers are located on Teacher Resource 3.

Launch

- Students will write down their first name as many times as they can in their notebook within a one-minute period. Use the classroom clock, a timer, or a stopwatch to gauge the time. Next, the students will count and record how many times they wrote their name. Then, call on volunteers to tell how many times they wrote their name and record the information on a line plot on the board. Ask the students which number has the most names.

Teacher Facilitation

- Explain that a line plot is a piece of a number line that is used to record data or the number of times an event occurs. An X or other symbol is used to show frequency
- Introduce and model concept of determining the mode through interpreting a line plot. Ask students to tell which number occur the most and explain to the students that this number is called the mode
- Choose two student volunteers to come up to the board and stand on either end of the number line. Have them point to the number that is closest to their end of the number line. Give each child a panda cutout, Teacher Resource 4, to place on top of the number to which they pointed. Tell them that the panda is going to climb from number to number until the two pandas meet in the middle. Explain that at the point that the pandas meet is a special number called the median. This only occurs when there are an odd number of values. When there is an even number of values, the median is halfway between the last two numbers that the Pandas have touched. Have the students determine what the median is for this line plot.
- Explain to the students that they will be participating in another timed activity. That activity is determining how many times they can hit a ping pong ball with a paddle within a minute's time.
- Direct children to select a partner.
- Distribute one paddle and one ping pong ball to each pair.

Student Application

- Have one partner count the number of hits on the paddle while the other partner keeps track of the time. Repeat process for other partner.
- Students will record their names and number of hits on the line plot on the board as they finish. Students will then make a line plot of the data.

Embedded Assessment

- The teacher will perform informal assessments through the observation of the students' mastery of the concepts of median and mode.
- The teacher will ask student volunteers to name the mode and median of the data.

Reteaching/Extension:

- Have the students find the range for this line plot.

Lesson 3

Pre-Assessment

- Give students a copy of a blank line plot of the months of the year. Then students will survey their classmates about their birthday month and record the information on the line plot, Student Resource 4 Students will find the mode.

Launch

- Conduct an interactive read aloud of Long is a Dragon by Peggy Goldstein or substitute another book that introduces Chinese characters. Direct students to notice the shapes of each Chinese character.

Teacher Facilitation

- Model how to make the Chinese characters for the numbers one through ten.
- Distribute white construction paper and black markers and Student Resource 5
- Draw an angle on the board and explain that an angle is the point where two lines meet
- Display a Chinese character for go out and circle the four angles in the character

Student Application

- Students will circle the angles on the Chinese Characters on Student Resource 5.
- Students will cut out the characters and glue them onto the line plot to match with the number of angles for each character, Student Resource 6
- Students will determine the range, mode, and median for the line plot.

Embedded Assessment

- The teacher will perform informal assessments through the observation of the students' mastery of the concepts of median and mode.
- The teacher will ask student volunteers what the mode and median is from looking at the assembled line plot

Summative Assessment

Students will take an assessment (Student Resource 7) consisting of three selected response questions and one brief constructed response. The questions will cover the concepts taught: bar graphs, line plots, range, mode, and median and will be

used to measure students progress towards mastery of the covered topics. Answers can be found on Teacher Resource 5.

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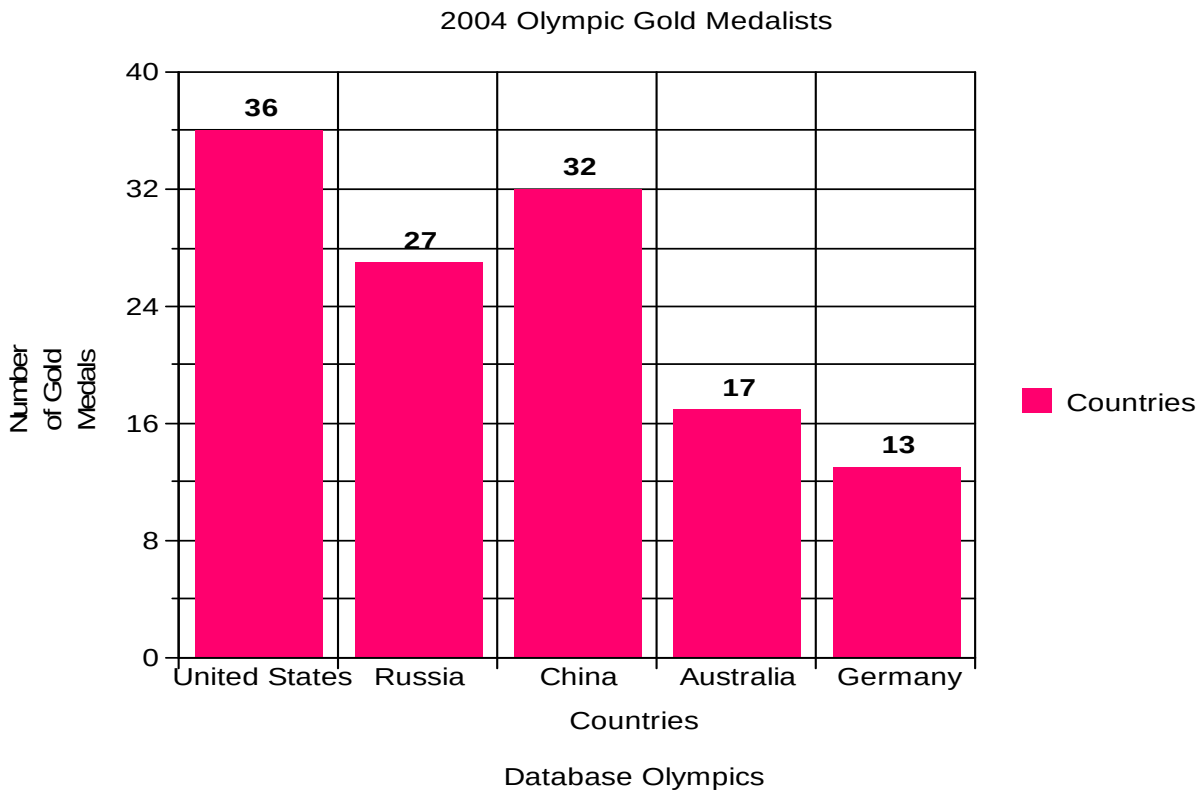
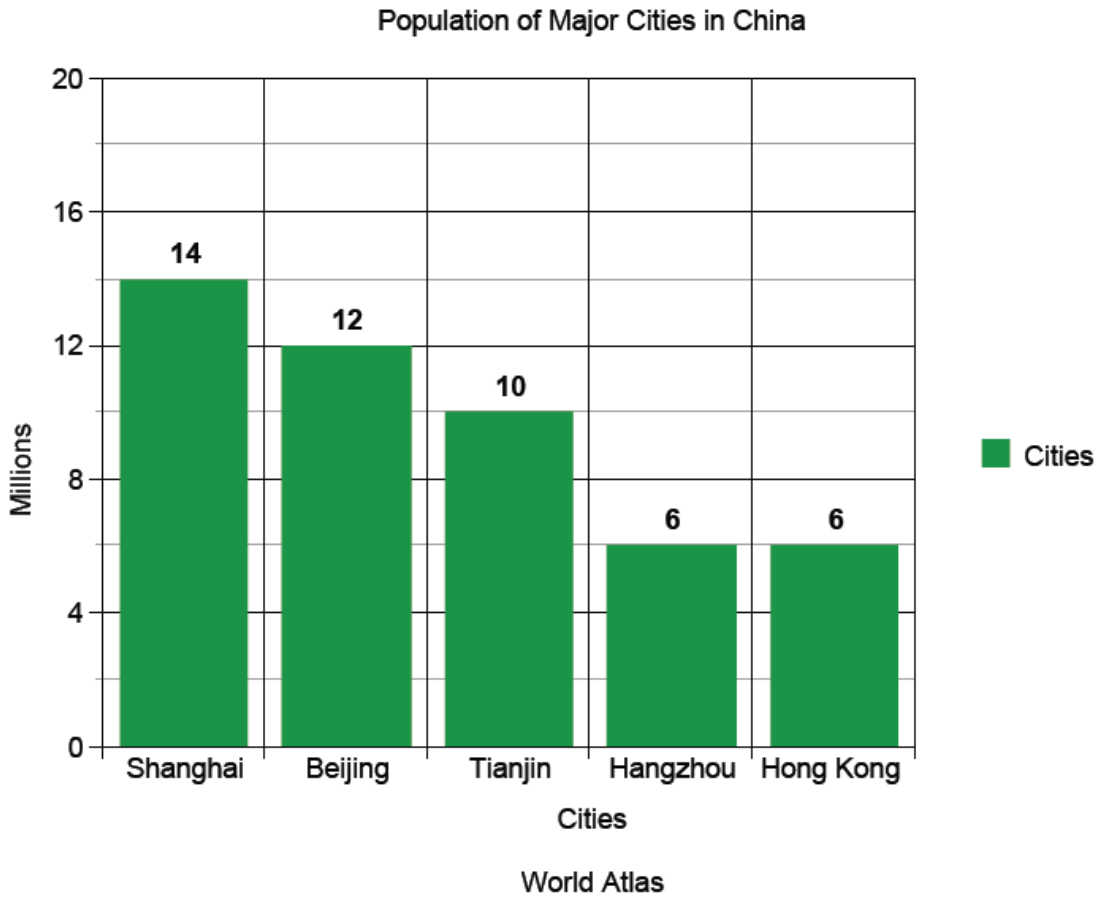
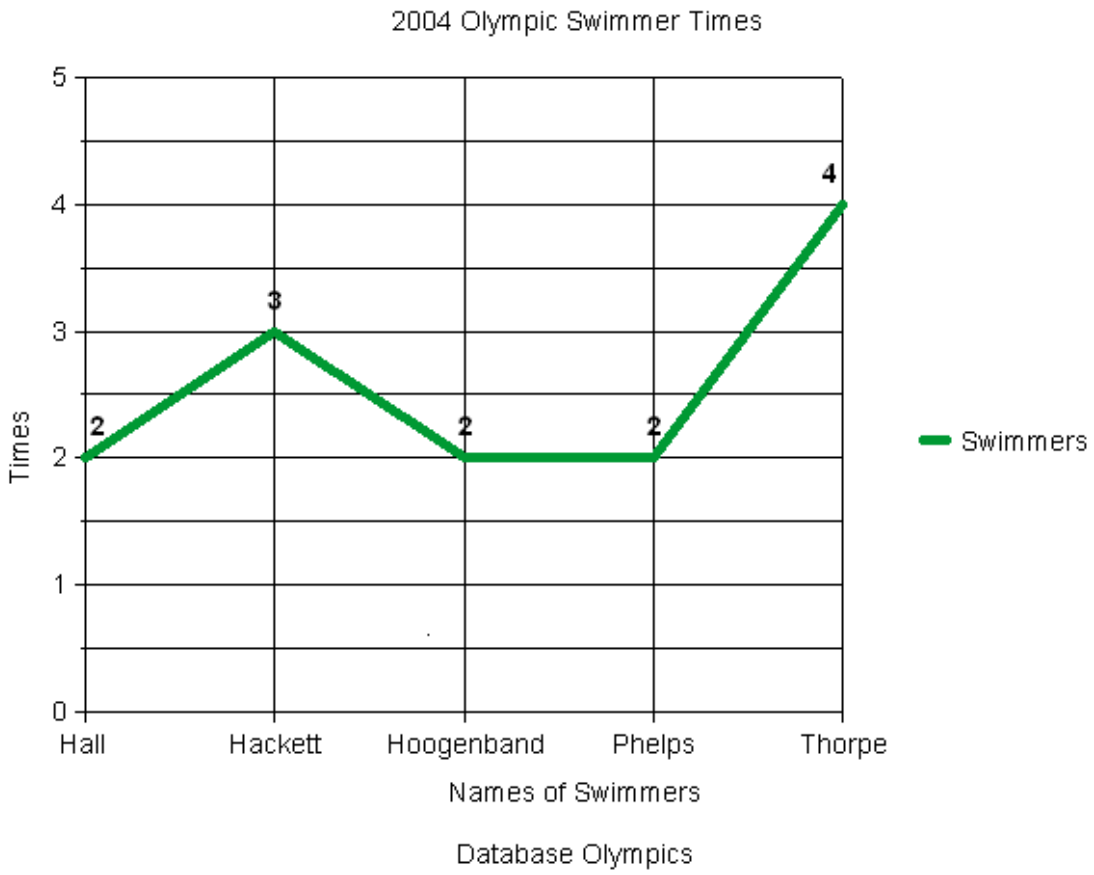
Appendix A: Teacher Resources

Teacher Resource 1

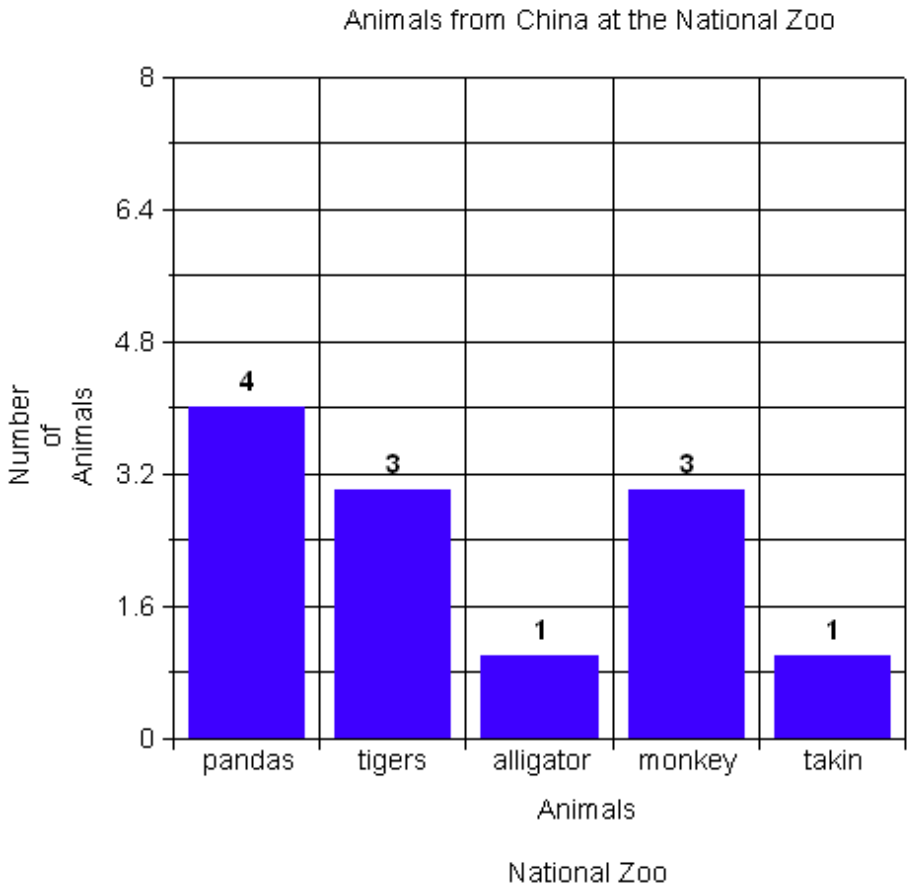


1. **Who won the most gold medals? United States**
2. **What is the range of the gold medals earned? 36-13=23**
3. **What is the middle number? 27**
4. **Who won the least gold medals of the countries listed in the bar graph? Germany**
5. **How many gold medals did Russia win? 27**


Population of Major Cities in China
20
16
12
8
4
0
Millions
14
12
10
6
6
Shanghai
Beijing
Tianjin
Hangzhou
Hong Kong
Cities
Cities
World Atlas



1. What is the time that is shown the most on this graph? 2 minutes
2. Who had the same times? Hall, Hoogenband, and Phelps



1. What is the range of the data? 4-1=3
2. What is the mode? 1
3. What is the median? 2

How did you know how to find the answers to these questions?

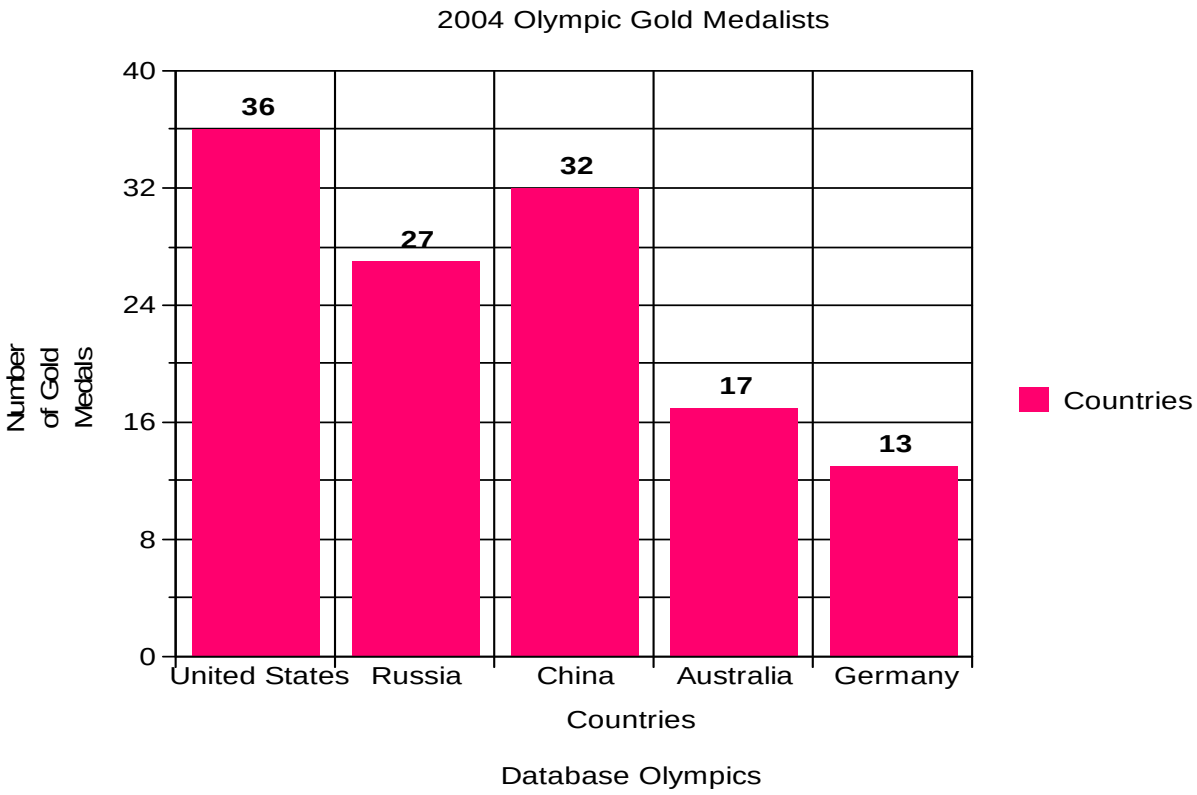
I looked at the lowest number and the highest number for the range.

I looked for the number that occurred more than other numbers to find the mode.

I looked for the middle number to find the median

Appendix B: Student Sources:

Student Resource 1



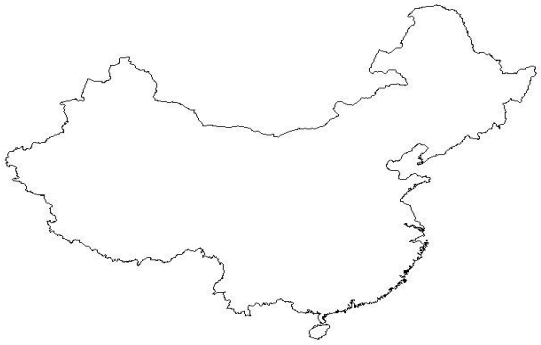
1. **Who won the most gold medals? _____**
2. **What is the range of the gold medals earned? _____**
3. **What is the middle number? _____**

4. **Who won the least gold medals of the countries listed on the bar graph?**
   _____

5. **How many gold medals did Russia win? _____**

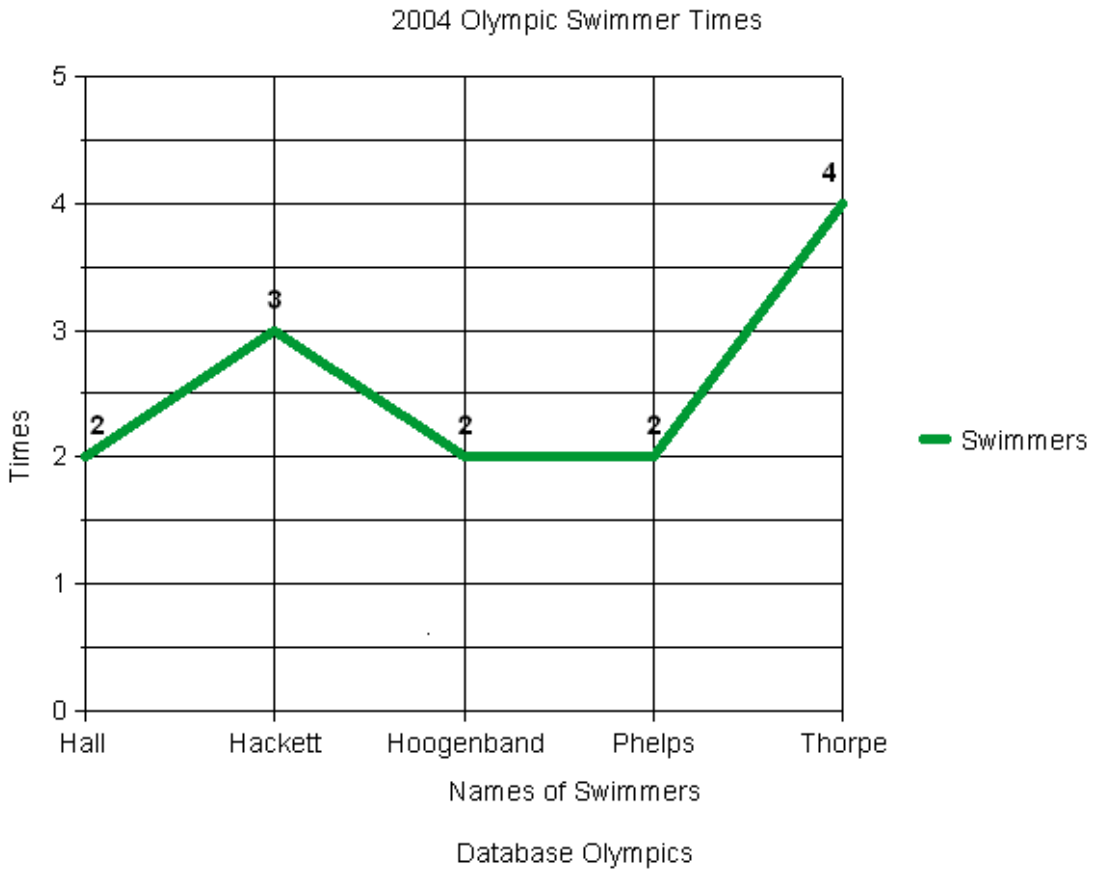
Miss P's class is preparing for a trip to China. They have been studying about the different cities in China, locating them on a map, and comparing the population of the cities. The first city that they studied was the capitol city of Beijing that has over 12 million inhabitants. However, they learned that Shanghai has even more people. It has 14 million people living in its city. Tianjin has the third largest population with 10 million people. Finally, the cities of Hangzhou and Hong Kong have similar populations, about 6 million people.

Miss P has asked her students to make a bar graph to help them to remember the populations of each city. They have started the work. Can you help them finish the bar graph located on the bottom of this page? Be sure to label the x and y axis.



16					
14					
12					
10					
8					
6					
4					
2					
0					

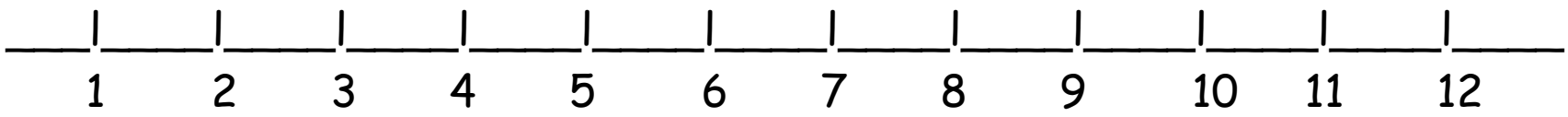
Major Cities of China



1. What is the time that is shown the most on this graph? _____

2. Who had the same times? _____

Our Birthday Months

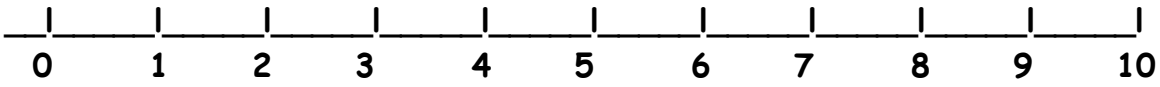


Months

What is the mode of this line plot? _____

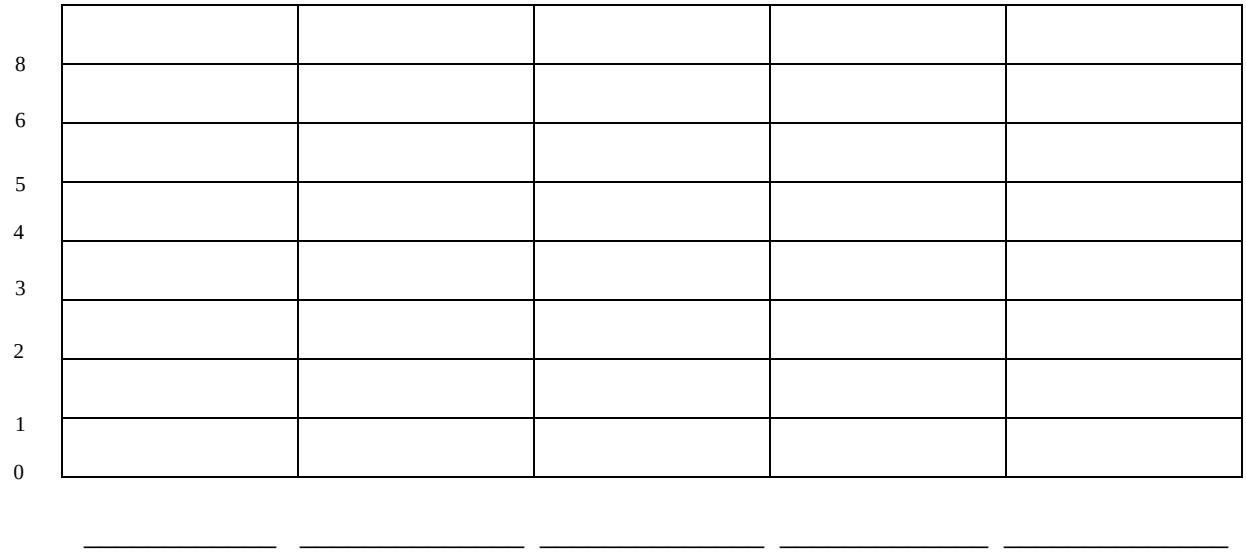
One	一
Two	二
Three	三
Four	四
Five	五
Six	六
Seven	七
Eight	八
Nine	九
Ten	十

2-D Line Plot



Number of Angles

Mrs. Janosky's class just finished learning about the endangered species of China. They learned about the Giant Panda, the Siberian tiger, the Chinese alligator, the takin, and the golden monkey. They need to make a bar graph of how many of these animals live at the National Zoo in Washington, D.C. At the zoo there are 4 pandas, 3 Siberian tigers, 3 golden monkeys, and 1 takin. Make a bar graph displaying this information. Make sure that you label your graph and answer all of the questions.



_____ _____ _____ _____ _____

Animals from China at the National Zoo

1. What is the range of the data? _____
2. What is the mode? _____
3. What is the median? _____

How did you know how to find the answers to these questions?

_____
_____
_____
_____
_____

Sources

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